
Small molecules greatly improve conversion of human-induced pluripotent stem cells to the neuronal lineage.

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Public Summary:

Efficient in vitro differentiation into specific cell types is more important than ever after the breakthrough in nuclear reprogramming of somatic cells and its potential for disease modeling and drug screening. Key success factors for neuronal differentiation are the yield of desired neuronal marker expression, reproducibility, length, and cost. Three main neuronal differentiation approaches are stromal-induced neuronal differentiation, embryoid body (EB) differentiation, and direct neuronal differentiation. Here, we describe our neurodifferentiation protocol using small molecules that very efficiently promote neural induction in a 5-stage EB protocol from six induced pluripotent stem cells (iPSC) lines from patients with Parkinson's disease and controls. This protocol generates neural precursors using Dorsomorphin and SB431542 and further maturation into dopaminergic neurons by replacing sonic hedgehog with purmorphamine or smoothened agonist. The advantage of this approach is that all patient-specific iPSC lines tested in this study were successfully and consistently coaxed into the neural lineage.

Scientific Abstract:

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